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Understanding the Opioid Crisis in Rural and Urban Iowa

According to the National Survey on Drug Use and Health, roughly 2.1 million Americans experienced an opioid misuse disorder in 2016, and 42,249 of those people died from an overdose. The United States makes up only four percent of the world population, yet it accounts for 27 percent of drug-overdose deaths. The Midwest and Northeast regions of the U.S. have experienced the largest increases in opioid-use deaths since 2000. In the Midwest, death rates are highest in large central metro counties, but have increased the most in micropolitan counties since 2000. Compared with other states, Iowa's opioid-use death (OUD) rates since 2000 are amongst the lowest in the U.S. This indicates that Iowa has not experienced the opioid epidemic as severely as much of the nation. However, Iowa's opioid-use death rates have increased over the past 20 years.

Understanding the geographic distribution and characteristics of opioid deaths in Iowa is essential to effectively addressing this crisis. Examining conditions in counties with high death rates may indicate factors that contribute to or cause higher rates of opioid use, while examining counties with low death rates may reveal changes that could be implemented to discourage opioid use. Here, we compare the existing conditions of the opioid epidemic in Iowa to surrounding states, describe patterns across the different types of opioids involved in deaths, and describe conditions related to the opioid crisis across Iowa counties. Finally, we present strategies and resources to address opioid abuse in Iowa communities.

Key Findings

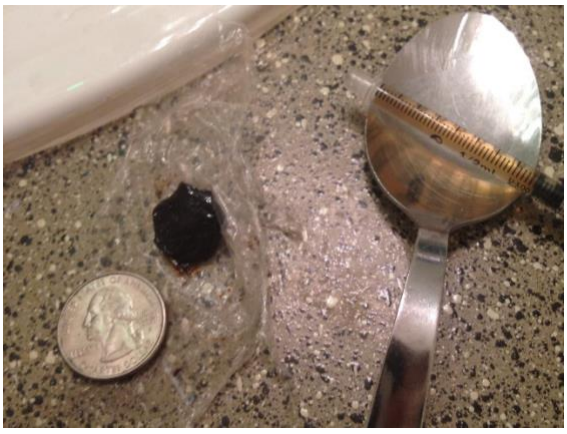
- Iowa opioid deaths are low and stable compared to surrounding states.
- Prescription opioid deaths are falling; synthetic and heroin deaths are rising.
- Metropolitan and micropolitan Iowa have the highest overdose death rates, primarily from heroin and synthetic opioids. Rural Iowa has low rates overall, mostly from prescription opioids.
- Rural opioid clusters linked to economic and law enforcement disadvantages, work in injury-prone jobs, and limited social capital.
- Urban opioid clusters have economic and law enforcement advantages, but it does not seem to abate opioid abuse. Limited social capital and more ethnic diversity may contribute, but the causes are unclear.

What are opioids?

Opioid drugs can be naturally derived from opium in poppy plants or chemically produced. Opioids act as a pain reliever and relaxant, but can be highly addictive due to the euphoric feeling they generate. While short-term use is often harmless, regular usage may result in dependence and addiction. There are several types of opioids including prescription opioids, synthetics, and heroin. They all have a chemical structure in common, but differ in potency and methods of usage.

Above are prescription opioids.

Prescription opioids include any opioid drug prescribed by doctors to treat moderate to severe pain. Some common types of prescription opioids include hydrocodone, oxycodone, oxymorphone, morphine, and codeine. These pharmaceuticals are 5-8 times more potent than morphine. Most opioid overdose deaths are from these prescription painkillers, since they are legally available in nearly every community in the nation.


Above is a piece of black tar heroin and needle.

Heroin is derived from morphine but is 2-3 times more potent. It comes in the form of a white or brown powder, or a black sticky substance called black tar heroin. Unlike prescription opioids, heroin is an illegal drug that is more common in larger cities. Heroin reaches the brain very quickly as it can be injected, smoked, snorted, or mixed with water. Besides being highly addictive, it is relatively inexpensive for users to buy, making heroin a deadly drug.


Above are brown and white powder heroin.

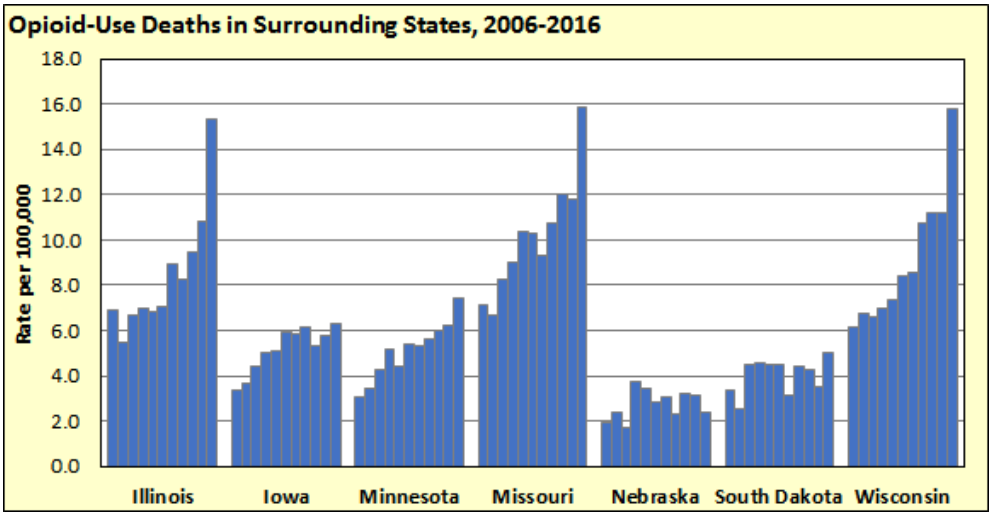
Synthetic opioids are highly potent drugs produced in laboratories that provide the same effects as naturally occurring opioids. Fentanyl is a legal synthetic often used by cancer patients, and is 100 times more potent than morphine, which makes it extremely dangerous. “U4” includes a number of illegal synthetics often produced abroad and smuggled into the U.S. Synthetics are often mixed with prescription opioids or heroin in the illegal drug trade. Such mixes are implicated in the recent surge of opioid overdose deaths nationally.

Shown above are lethal doses of white heroin versus synthetic opioids fentanyl and carfentanil.

Iowa has low and stable opioid death rates compared to surrounding states.

Opioid-use death rates in Iowa are somewhere in the middle compared to surrounding states, with rates in Nebraska and South Dakota being lower, and rates in Illinois, Missouri, and Wisconsin being much higher. Iowa opioid deaths rates grew from 2006 to 2011, but have remained relatively stable since then at around six deaths per 100,000 people. Minnesota also has middling opioid death rates, but theirs have increased steadily since 2006. In stark contrast, Illinois, Missouri, and Wisconsin have significantly higher opioid death rates, with all three experiencing significant jumps between 2015 and 2016. With death rates around 16 per 100,000, it is clear the opioid problem has reached crisis levels in these states.

One major factor that could explain state differences in opioid death trends is population and urbanization. States with larger metropolitan populations—Illinois, Wisconsin, and Missouri—are the ones with higher death rates. Deaths in these states have not been caused by prescription opioids. Instead, overdose deaths are driven by heroin and multiple-opioids (mixes of prescriptions-synthetics or heroin-synthetics). On the other hand, states with larger rural populations—Iowa, Nebraska, and South Dakota—have relatively lower death rates. Iowa and rural states to the west have largely been spared these new opioid formulations.



Data and Definitions

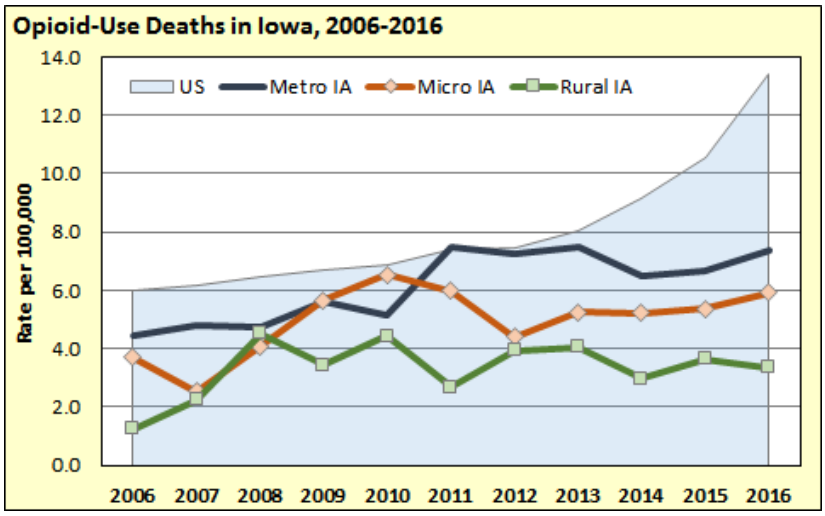
Opioid-use deaths are taken from the National Center for Health Statistics (NCHS) Multiple Cause of Death microdata. Deaths are reported as age-adjusted rates per 100,000 people by residence of the deceased. Opioid-use deaths include ICD-10 codes for drug overdoses (X40-44, X60-64, X85, Y10-14) that include the presence of opioids (T40.0-40.4 or T40.6); or mental health or behavioral deaths caused by opioids (F11.0-11.9). Confidentiality restrictions prevent reporting rates by county.

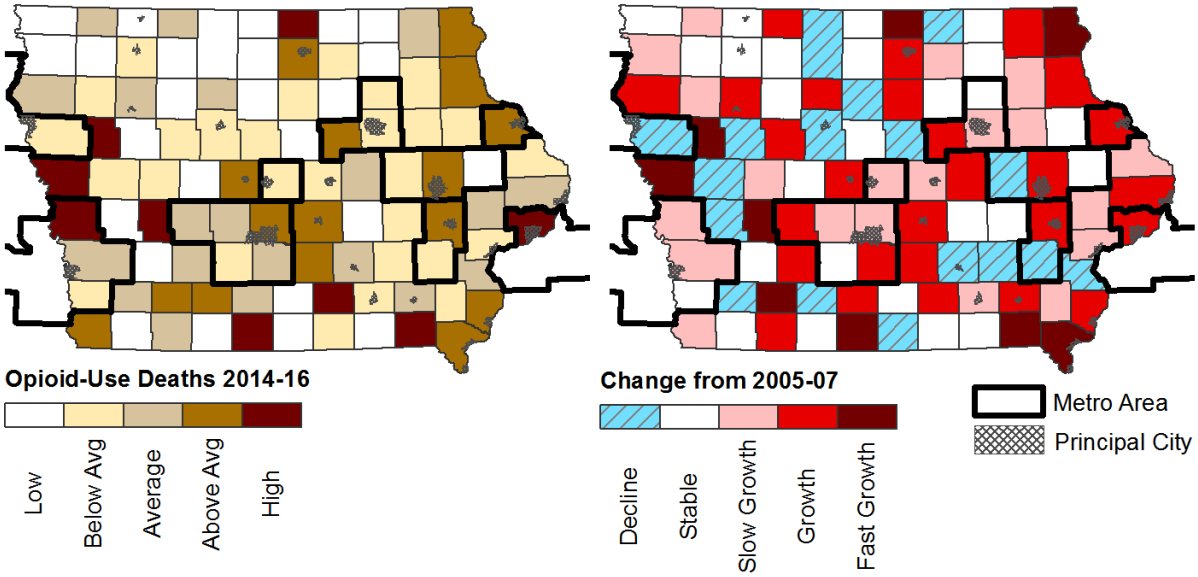
Metropolitan includes central counties with an urban center over 50,000 people, plus outlying suburbs linked by commuting. Micropolitan counties have an urban center of at least 10,000 people, plus surrounding suburbs. Rural counties (technically non-core) have no urban center of 10,000 or more.

Opioid deaths higher in urban Iowa, but still lower than U.S. rates.

Overall, opioid-use deaths are much lower in Iowa than the rest of the nation. Opioids kill 7.4 Iowans per 100,000 in metropolitan counties, and slightly fewer in micropolitan areas (5.9 per 100,000). However, rates in urban Iowa are roughly half the national rate of 13.4 deaths per 100,000. Rural Iowa has been relatively unaffected, with only 3.3 opioid deaths per 100,000. After rising in the late 2000s, opioid deaths in metro Iowa have remained relatively stable. Micropolitan counties have seen a slow yet steady rise in death rates, while rural areas have experienced little change overall.

Metros with the highest opioid death rates include Davenport, Harrison County (suburban Council Bluffs), and Dubuque. Mason City and Fort Madison are among the hardest hit micropolitans. Although rural opioid death rates are low, several counties posted high rates like Ida, Monona (Onawa), and Van Buren (Keosauqua). Most of these counties also had fast gains over the past ten years. However, some counties with lower rates also had fast gains including Buena Vista (Storm Lake) and Calhoun in the north, Tama County in central Iowa, and the Des Moines suburban counties of Guthrie and Warren (Indianola).





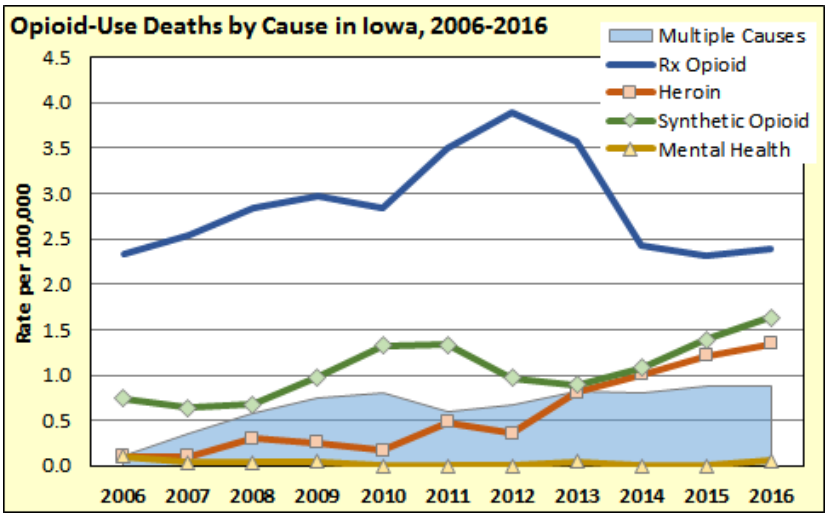
Prescription deaths declining, synthetic opioid and heroin deaths rising.

One major finding is that prescription opioid deaths have fallen off sharply in Iowa, dropping from 4.0 to 2.5 per 100,000 in the 2010s. This runs counter to public perception that prescription users are the face of the opioid crisis. However, prescriptions still account for most opioid-use deaths in Iowa. Nationally, prescription overdose rates have not improved much over time, hovering around four deaths per 100,000 people.

Deaths from synthetic opioids and heroin have risen steadily since 2013, offsetting declines in prescription deaths. Synthetic overdoses have climbed from 0.7 deaths per 100,000 in 2006 to 1.6 in 2016, but this is less than half the national rate of 3.9. The synthetic opioid problem is spiraling out of control nationally, with death rates jumping by 40 percent between 2014 and 2015 and by a stunning 80 percent in 2015-16. By contrast, Iowa deaths have only grown by about 20 annually for the past few years. Heroin deaths follow a similar pattern, with rates of 1.3 per 100,000 in Iowa being lower than the national rate of 2.6. However, heroin deaths continue to increase in Iowa, while they have leveled off nationally.

Death from multiple combinations of opioids has remained relatively stable in Iowa, despite growing exponentially to crisis levels in other states. Less than one Iowan per 100,000 overdosed from multiple opioids, compared to 3.5 nationally. Further, very few Iowans die from behavioral or mental health issues linked to opioid addiction, indicating that drug overdoses drive most opioid deaths.

Overall, opioid-use deaths in Iowa are stable, but this masks an important change. Prescription deaths are falling, yet deaths from heroin and synthetic opioids are rising. As drug users switch from legally produced prescriptions with a known potency to illicit opioids with unknown potency, this will not only increase the number of fatal overdoses, but will also change state responses to the opioid crisis. State regulation of prescribers and dispensers may not be sufficient to reduce deaths from illegal drugs. Rather, law enforcement should start targeting criminal drug networks that supply illicit opioids—heroin and synthetics—that are becoming increasingly common in Iowa.

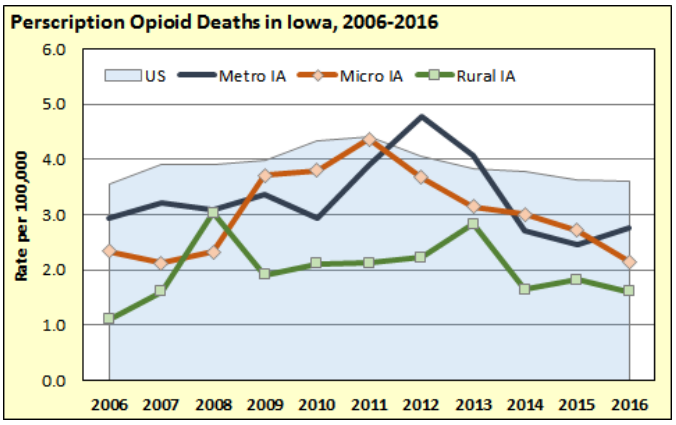


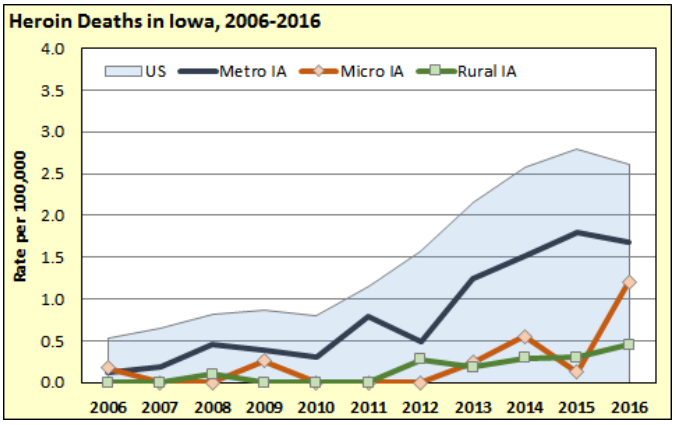
Prescription opioid deaths in urban Iowa were at or exceeded national rates in the early 2010s, but have fallen dramatically since then. Micropolitan rates have declined steadily, while metro rates have leveled off in the past few years. Rural counties experienced smaller declines, yet death rates are low. The prescription opioid drug problem seems to have stabilized in Iowa.

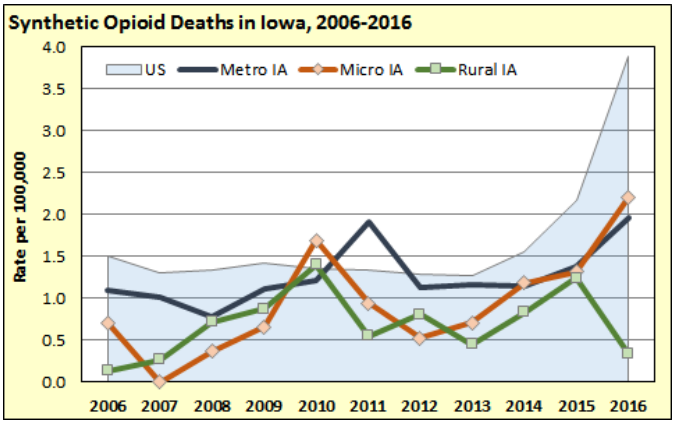
However, deaths from heroin are on the rise in metro Iowa, although it is still below national rates. Heroin deaths have been very low in micropolitan and rural Iowa, yet micro deaths spiked in 2016. Heroin appears to be an emerging problem in Iowa's urban centers, while it is still rare in rural parts of the state.

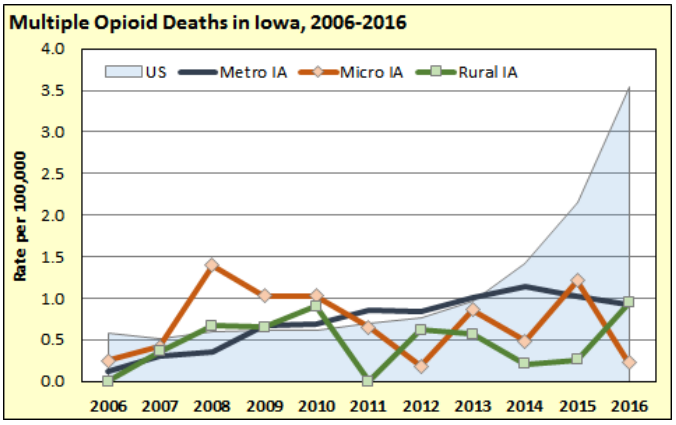
Like the rest of the nation, metro and micropolitan Iowa have seen a steep rise in deaths from synthetic opioids over the past several years. However, rates are lower and growth is slower than in other states that have seen a spike in deaths. Rural Iowa has been relatively unaffected by synthetic opioids. Statewide programs to address both heroin and synthetic opioid abuse should have an urban-focus, to address challenges facing large cities (e.g. poverty) as well as capitalizing on their advantages, such as access to addiction treatments and other social services.

For the most part, Iowa has been spared the sharp increase in deaths from multiple opioid mixes (combination of prescription or synthetics opioids and heroin) that has plagued the rest of the country. Death rates are low and vary widely across years, making trends hard to discern.



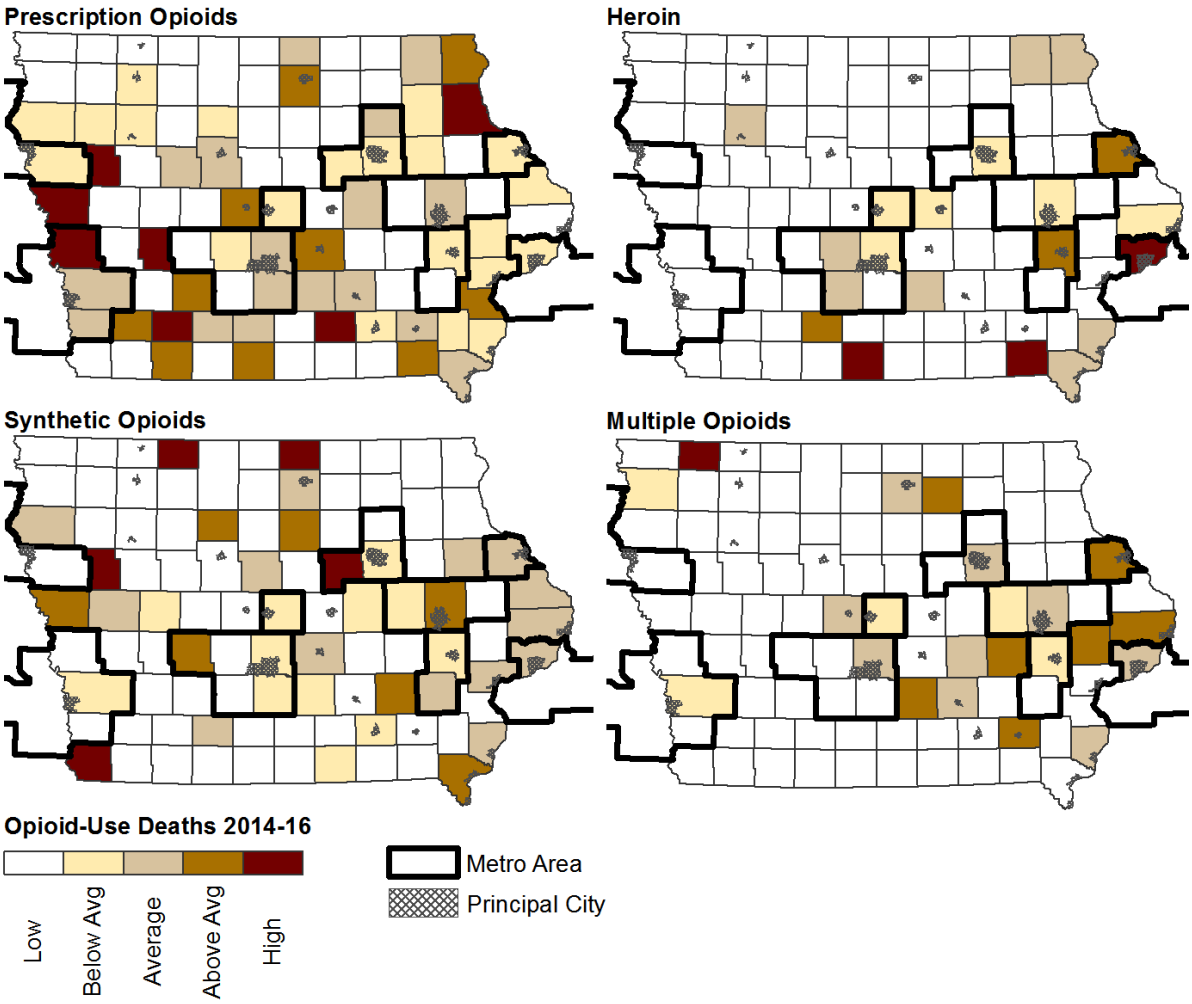






Examining the four maps below, we see that prescription opioids are a widespread problem across Iowa, while other types of opioids are much more localized. Prescription overdose deaths tend to cluster in Iowa's rural counties, especially along the western and southern borders. Rates are high in Adams (Corning), Harrison (suburban Council Bluffs), Van Buren (Keosauqua), Monroe (Albia), Audubon, Clayton (Elkader), Monona (Onawa), and Ida (Ida Grove) counties. Prescription opioids are also a problem in a few micropolitans including Boone, Mason City, and Netwon. Most of northern Iowa has low death rates from these pharmaceuticals.

Heroin is heavily concentrated in three metropolitans in eastern Iowa—Davenport, Dubuque, and Iowa City. However, there are isolated pockets in rural Decatur (Lamoni, Leon) and Van Buren counties in the south. Synthetics are scattered across the state in certain rural counties; and in Cedar Rapids, Fort Madison, Keokuk, and some counties adjacent to large metros. Iowans dying from multiple opioids are located in the east, especially in the counties of Jefferson (Fairfield), Iowa (near Iowa City), Marion (Knoxville, Pella), Dubuque, and Clinton. However, the highest death rates from multiple opioids are in two northern rural counties, Osceola (Sibley) and Floyd (Charles City).



High opioid places are rural, white, and dominated by prescription overdoses. Above average places are urban, educated, and have more multiple opioid deaths. Both have high heroin and synthetic deaths. Both have fewer Hispanic populations

Both *high* and *above average* OUD clusters have high mortality rates from prescription, synthetics, and heroin than other counties in Iowa. However, *high* places have much more prescription opioid deaths, while *above average* places tend to have slightly more deaths from multiple opioids.

In terms of demographics, *high* OUD counties are very similar to average and low OUD places, being mostly rural with smaller populations and lower densities. However, high opioid places differ from low ones by having less ethnic diversity with fewer Hispanics; older populations with fewer younger people and more senior citizens; and fewer college graduates.

By contrast, *above average* OUD places are quite different from all other groups, even high OUD places, being mostly urban with larger populations and higher population densities. Above average places have larger shares of African-Americans, but have lower shares of Hispanics than average and low opioid counties. These places also have larger shares of working-age populations age 18-64; and are much better educated with fewer high school non-completers and more college graduates.

	Opioid-Use Deaths 2014-16			
Health & Demographics	*High (n=9)*	*Above Avg (n=16)*	*Average (n=20)*	*Low & Below Avg (n=54)*
Drug Deaths 2014-16 (# per 100,000)				
Heroin drug deaths	1.98 *A,L*	1.30 *A,L*	0.37	0.10
Prescription opioid deaths	7.67 *AA,A,L*	5.10 *A,L*	3.12	0.76
Synthetic opioid deaths	2.27 *A,L*	2.31 *A,L*	1.24	0.65
Multiple opioid deaths	0.20 *AA,A*	0.85 *L*	0.83	0.21
Non-opioid drug deaths	5.49	6.52	4.54	4.26
Demographics 2016 (%)				
Population (#)	26,490 *AA*	74,875 *A,L*	24,507	21,853
Population density (# sq.mi.)	56.06 *AA*	126.16 *A,L*	39.66	38.16
Urban-rural influence 2003 (1-12)	7.00 *AA*	5.44 *L*	6.25	6.89
African-American	1.31 *AA*	2.25 *A,L*	1.10	1.10
Hispanic, any race	2.38 *AA,A,L*	3.12 *A,L*	6.34	4.41
Age 17 & younger	22.32 *A,L*	22.53 *A,L*	23.28	23.22
Age 65 & older	20.18 *AA,A*	17.85 *L*	18.17	19.30
High school non-completers	9.66 *AA*	7.41 *A,L*	9.17	9.07
College graduates	17.96 *AA,A,L*	23.95 *L*	21.32	20.08

NOTE: Significant difference from Above Average (*AA*), Average (*A*), and Low and Below Average (*L*) at p<.10.

High opioid places are economically disadvantaged, with high-injury industries. Above average places dominated by low-injury services jobs, no income differences.

High OUD counties are economically disadvantaged. They have the lowest employment participations rates (indicating more people are unemployed or have dropped out of the labor market), have the lowest median household incomes, and have the highest poverty rates across all groups. In addition, high opioid counties have a much larger percentage of their population employed in transportation, tele-communications, and public utility firms. Workplace injuries are relatively common in this sector, with high rates in people employed in the courier/delivery (12.5 per 100 workers), utilities (5.5 per 100), and warehousing (5.1 per 100) sectors. However, there are no differences between high versus average and low OUD places in terms of goods-producing sectors (manufacturing, construction, etc.) and agriculture, which are also prone to job-related injuries, with rates of around 4.0 per 100 workers.

On the other hand, *above average* OUD places have an absence of traditional rural industries like agriculture or goods-production. Instead, these urban places are more specialized in high-skill professional, finance, and real estate services; but also in low-skill retail trade and leisure services (entertainment, tourism, food, and personal services). This suggests opioid addiction in these places may not be driven by workplace injuries, as service-sector jobs tend to have low rates. For example, injury rates in professional services are around 1.0 per 100 workers, while retail and leisure services rates are 3.3 per 100. In addition, above average places are no better or worse off than average and low opioid places, having statistically identical incomes and poverty rates.

Occupational injury rates in Iowa are taken from the U.S. Bureau of Labor Statistics for 2017.
https://www.bls.gov/iif/oshstate.htm

	Opioid-Use Deaths 2014-16			
Employment & Income	*High (n=9)*	*Above Avg (n=16)*	*Average (n=20)*	*Low & Below Avg (n=54)*
Employment 2016 (%)				
Employment participation	48.36 *AA,A,L*	50.78 *L*	50.41	49.21
Agriculture & natural resources	7.63 *AA*	5.03 *A,L*	6.81	7.61
Manufacturing, construction, & mining	23.27	22.91 *L*	24.36	24.49
Transportation, telecom, & utilities	7.55 *AA,A,L*	6.39	6.45	6.32
Professional, finance, real estate srvs.	9.60 *AA,A*	11.72 *L*	11.84	9.59
Health, social, & educational srvs.	24.26	25.14 *A*	23.15	23.80
Retail & leisure srvs.	22.01	22.81 *A,L*	21.30	22.00
Income 2016				
Median HH income ($)	$48,109 *AA,A,L*	$52,848	$52,798	$51,405
Poverty (%)	13.20 *AA,A,L*	11.72	11.59	11.71
Gini income inequality (0-100)	43.36	42.98	42.50	42.86

NOTE: Significant difference from Above Average (*AA*), Average (*A*), and Low and Below Average (*L*) at p<.10.

High opioid places have low crime, but no drug enforcement. Above average places have strong drug enforcement, but high property crime. Both have poorer social capital. No differences in opioid prescribing rates.

Surprisingly, opioid prescribing rates did not differ between *high* OUD places and average and low ones. In fact, prescribing rates are actually lower in high versus above average places, even though high places have more prescription opioid deaths. This suggests that local supply is not the sole cause of prescription opioid deaths. Another finding is that the highest opioid death rates are occurring in places with very low violent and property crime rates, even lower than places with few opioid deaths. While opioids have hit these communities hard, it does not appear to have generated a wider crime problem. In terms of social capital, we find that high OUD places have few civic, social, or political organizations to deal with the opioid crisis; and that citizens tend to be less politically engaged by having lower voter turnout.

Above average OUD places have a strong drug enforcement presence, as evidenced by higher arrest rates for non-cannabis drugs and narcotics. By contrast, there is little enforcement in high OUD places. This likely reflects larger police agencies in urban areas with specialized narcotics or drug officers. While violent crime is no different from average and low places, we find that above average opioid counties have high rates of property crime, indicating the opioid crisis may result in broader non-violent crimes in larger cities. Despite their large populations, these counties score low on several social capital measures. Above average places have fewer religious organization and fewer recreational venues than all other groups, meaning fewer options for addicts to engage in pro-social interactions to reduce drug dependency.

	Opioid-Use Deaths 2014-16			
Social Conditions	*High (n=9)*	*Above Avg (n=16)*	*Average (n=20)*	*Low & Below Avg (n=54)*
Organizations 2014 (# per 10,000)				
Religious orgs.	119.61 *L*	105.31 *A,L*	123.22	142.64
Civic, social, & political orgs.	6.60 *AA,A,L*	13.54	11.64	11.79
Business, professional, & labor orgs.	18.34	22.49 *L*	19.95	16.55
Recreational orgs.	29.19	25.49 *A,L*	31.42	33.53
Non-profit entities	787.80	815.65	752.90	792.30
Civic Participation 2014 (%)				
Response rate to Census	71.57	72.42 *A*	70.26	71.54
Voter turnout in national elections	76.33 *AA,L*	79.31 *A*	77.30	78.46
Crime 2014-16 (# per 100,000)				
Opioid prescribing rate (# per 100)	54.09 *AA*	69.77 *A*	52.43	61.58
Non-cannabis drug arrests	50.60	94.91 *A,L*	74.02	77.83
Opioid & narcotics arrests	7.23 *AA*	19.54 *A,L*	7.63	8.84
Violent crimes	68.51 *AA,A,L*	120.40	96.75	105.06
Property crimes	183.71 *AA,A,L*	396.94 *A,L*	275.62	290.03

NOTE: Significant difference from Above Average (*AA*), Average (*A*), and Low and Below Average (*L*) at p<.10.

Summary

The opioid problem has not yet reached crisis levels in Iowa, rather it is an emerging drug issue that will need to be managed by state agencies and local communities. This report provides background information on the current status and trends in opioid-use deaths in Iowa, comparisons across urban and rural counties, and a description of the socioeconomic conditions of high and low opioid death places. From this, we identify several important findings.

Looking statewide, Iowa has low and stable opioid death rates compared to surrounding states. Opioid deaths are highest in metropolitan and micropolitan Iowa, but rates are still below the national average. One important finding is that prescription opioid deaths are falling, but synthetic opioid and heroin deaths are rising. Thus, the opioid problem in Iowa is shifting away from prescription drugs to illicit ones like heroin and synthetics.

High OUD counties are dominated by prescription overdoses, but also include heroin and synthetics. These places tend to be rural, have older and mostly white non-Hispanic populations, are economically disadvantaged with lower incomes and higher poverty, and have more jobs in injury-prone industries like transportation and utilities. This suggests a link between opioid addiction and work-related injuries, coupled with economic decline. Drug arrest rates are low, indicating a lack of enforcement capacity in these mostly rural jurisdictions. However, rates of violent and property crime are also low, implying the opioid crisis has not generated a widespread crime problem in these communities.

By contrast, above average opioid-use death counties have more overdoses from multiple-cause opioids, as well as single-cause deaths from prescriptions, heroin, and synthetics. Located in higher population urban centers, these places are more diverse with more African Americans but fewer Hispanics, are better educated, have more jobs in the services sector that are less injury-prone, and are similar in terms of income to places with lower opioid deaths. In short, these urban places have many socioeconomic advantages, yet these are not enough to counter opioid addiction. Being located in larger cities, drug arrest rates are higher as these agencies likely have specialized drug task forces. Another surprising finding is that above average places have fewer organizations (per 10,000 people) that can help with drug addiction, such as religious and recreational groups that promote pro-social behaviors.

In summary, the opioid crisis in urban and rural Iowa appears to be driven by different factors. The problem in rural Iowa appears to be driven by poverty and low employment rates, work in injury-prone jobs, lack of adequate law enforcement, and few civic and social organizations to deal with the drug problem. Taken together, it is plausible these conditions are driving addiction and overdoes in rural Iowa. On the other hand, urban areas have economic and law enforcement advantages that rural areas do not, but this does not seem to abate opioid abuse. More research is needed to understand the mechanisms driving addiction and death in these urban communities in Iowa.

Strategies to Combat the Opioid Crisis

So what can states and local communities do to reduce opioid-use deaths? The Centers for Disease Control and Prevention (CDC) has outlined the best evidenced-based practices to prevent opioid overdoses. The following are taken directly from the CDC report "Evidence-based strategies for preventing overdoses: What's working in the United States".

Targeted Naloxone Distribution. Naloxone is an opioid antagonist that can quickly and safely reverse the potentially fatal effects of an opioid overdose. Targeted distribution programs seek to train and equip individuals who are most likely to encounter an overdose with naloxone kits (e.g. police officers or first responders). Effective distribution approaches include community distribution programs, co-prescription of naloxone, and equipping first responders. The CDC also recommends naloxone distribution in treatment centers and criminal justice settings, where individuals who are about to be released from supervision or cease treatment receive overdose response training and naloxone kits prior to their exit from the program or facility.

Medication-Assisted Treatment. (MAT) is a proven pharmacological treatment for opioid-use disorders. The backbone of this treatment is Food and Drug Administration (FDA) approved medications. Agonist drugs, such as methadone and buprenorphine, activate opioid receptors in the brain that prevents painful opioid withdrawal symptoms without causing euphoria. Naltrexone is also used in MAT, but this drug blocks the effects of opioids. MAT is effective at reducing opioid abuse and helping people to lead normal lives. CDC also recommends that MAT should be made available to incarcerated individuals with opioid use disorders; and then be linked with appropriate care providers to continue MAT upon release. CDC further recommends that patients receiving care in emergency departments who have untreated opioid use disorders should also be referred to a MAT provider, allowing treatment to start immediately. This referral should be accompanied by initial doses of methadone or buprenorphine at hospital.

Academic Detailing. Detailing is a structured educational strategy developed by commercial manufacturers of medical and pharmaceutical technologies to market these products to prescribers and pharmacists. Academic detailing consists of structured visits to healthcare providers by trained professionals who can provide tailored training and technical assistance, helping healthcare providers use best practices. Academic detailing has been used to assist physicians in reducing potentially risky opioid prescribing practices, and to prepare pharmacists to effectively distribute naloxone to the public.

Eliminating Prior-Authorization for Medications for Opioid Use Disorders. In this scenario, health insurance providers cover the cost of MAT as a standard benefit, and all requirements that a physician contact the insurance provider for approval prior to writing the prescription (a process called prior authorization) are removed. Without these prior authorization requirements, prescriptions for MAT medications to treat opioid use disorders can be written and filled as soon as a physician deems this treatment necessary.

Screening for Fentanyl in Routine Clinical Toxicology Testing. The standard panel of substances included in routine clinical drug screens (carried out in hospitals, clinics, or treatment centers) should include screening for fentanyl exposure, particularly in jurisdictions where fentanyl is known to be prevalent in the local illicit drug market.

911 Good Samaritan Laws. 911 Good Samaritan Laws refers to local or state legislation that may provide overdose victims and/or overdose bystanders with limited immunity from drug-related criminal charges and other criminal or judicial consequences that may otherwise result from calling first responders to the scene. The scope of 911 Good Samaritan Laws varies from state to state, but each is written with the goal of reducing barriers to calling 911 in the event of an overdose.

Syringe Services Programs. Sometimes called needle exchange or syringe exchange, syringe services programs provide access to clean and sterile equipment used for the preparation and consumption of drugs as well as tools for the prevention and reversal of opioid overdose, such as naloxone training and distribution, fentanyl testing strips, and more. Comprehensive syringe services programs also provide additional social and medical services. These include safe disposal of syringes and needles; testing for HIV and hepatitis C infection and linkage to treatment; education about overdose and safer injection practices; referral and access to drug treatment programs, including MAT; tools to prevent HIV and other infectious disease, such as condoms, counseling, or vaccinations; and linkage to medical, mental health, and social services.

Iowa Resources

Iowa Department of Public Health

Drug Resources
https://yourlifeiowa.org/resources

Opioid Treatment Programs
https://idph.iowa.gov/mat/otp

Assistance Programs
https://idph.iowa.gov/mat

Iowa Hospital Association

Opioid Resources
https://www.ihaonline.org/Issues/Opioids

Governor's Office of Drug Control Policy
https://odcp.iowa.gov

Iowa State University

PROSPER Rx Project
http://www.ppsi.iastate.edu/prosper-rx

Rural Opioids Project
http://ruralopioids.soc.iastate.edu

Community Groups

Parents Addicted to Hope
https://www.facebook.com/groups/146309946082319

Contributors

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Appendix

A. References

Carroll, Jennifer J; Green, T. C.; Noonan, R. K. 2018. Evidence-based strategies for preventing opioid overdoses: What's working in the United States. *Centers for Disease Control and Prevention (CDC),* U.S. Department of Health and Human Services. https://www.cdc.gov/drugoverdose/pdf/pubs/2018-evidence-based-strategies.pdf

Erickson, Amanda. 28 December 2017. Opioid abuse in the U.S. is so bad it's lowering life expectancy. Why hasn't the epidemic hit other countries? *The Washington Post*.

Media Tip Sheet: Synthetic Opioids. *Drug Policy Alliance.* https://www.drugpolicy.org/sites/default/files/documents/MediaTipSheet_SyntheticOpioids.pdf

Monnat, Shannon M. 2018. Factors Associated With County-Level Difference in U.S. Drug-Related Mortality Rates. *American Journal of Preventative Medicine*. Volume 55, Issue 5, pp. 611-619.

Opioids. *National Institute on Drug Abuse.* https://www.drugabuse.gov/drugs-abuse/opioids#summary-of-the-issue

Rigg, Khary K; Monnat, S. M.; Chavez, M. N. 1 August 2017. Opioid-related mortality in rural America: Geographic heterogeneity and intervention strategies. *International Journal of Drug Policy*.

Photo Credits

Pill Identifier from WebMD (prescription opioids). U.S. Drug Enforcement Agency (tar and powder heroin). New Hampshire State Police by B.A. Taylor (synthetic opioids). Other photos from iStock by Getty Images.

B. Data and Methods

Opioid-use deaths rates are taken from the National Center for Health Statistics (NCHS) Multiple Cause of Death microdata. Deaths are reported as age-adjusted rates per 100,000 people by residence of the deceased. Opioid-use deaths include ICD-10 codes for drug overdoses (X40-44, X60-64, X85, Y10-14) that include the presence of opioids (T40.0-40.4 or T40.6); or mental health or behavioral deaths caused by opioids (F11.0-11.9). Data are pooled into three-year periods to prevent fluctuations in small counties with few deaths. ***Demographic and economic data*** are taken from the 2000 Decennial Census and the 2012-2016 American Community Survey. ***Crime and arrest rates*** are taken from the Federal Bureau of Investigation's Crime in the United States dataset, which is compiled at the county level over time by ICPSR at the University of Michigan. Crime and arrests are pooled over three-year periods and are reported as rates per 100,000 people residing in jurisdictions reporting to FBI. ***Opioid prescribing rates*** are taken from QuintilesIMS Transactional Data Warehouse, maintained by the U.S. Centers for Disease Control and Prevention. Data are pooled over three-year periods and reported as rates per 100 people. ***Social capital data*** are taken from the Social Capital Index created by Northeast Regional Center for Rural Development at Pennsylvania State University.

Statistical methods employed a general linear multivariate model (MANOVA) to test mean differences using the Games-Howell Test, which corrects for unequal group sizes and unequal group variables. Classification of counties into opioid-use death groups (high, above average, average, below average and low) is done using Jenks optimization, which finds natural breaks in a data series. Missing data for the crime and opioid prescribing data are imputed using Monte Carlo Markov Chain models using 500 imputations, dropping imputed cells with coefficients of variation over 35 percent to ensure consistent replication.

C. Tables for Accessibility

Health and Demographics				
Opioid-Use Deaths 2014 to 2016	*High*	*Above Average*	*Average*	*Low-Below Average*
Number of counties	9	16	20	54
Drug Deaths 2014-16 (number per 100,000)				
Heroin drug deaths	1.98	1.30	0.37	0.10
Prescription opioid deaths	7.67	5.10	3.12	0.76
Synthetic opioid deaths	2.27	2.31	1.24	0.65
Multiple opioid deaths	0.20	0.85	0.83	0.21
Non-opioid drug deaths	5.49	6.52	4.54	4.26
Demographics 2016 (percent)				
Population (number)	26,490	74,875	24,507	21,853
Population density (number per sq.mi.)	56.06	126.16	39.66	38.16
Urban-rural influence 2003 (1 to 12)	7.00	5.44	6.25	6.89
African-American	1.31	2.25	1.10	1.10
Hispanic, any race	2.38	3.12	6.34	4.41
Age 17 and younger	22.32	22.53	23.28	23.22
Age 65 and older	20.18	17.85	18.17	19.30
High school non-completers	9.66	7.41	9.17	9.07
College graduates	17.96	23.95	21.32	20.08

Employment and Income				
Opioid-Use Deaths 2014 to 2016	*High*	*Above Average*	*Average*	*Low-Below Average*
Number of counties	9	16	20	54
Employment 2016 (percent)				
Employment participation	48.36	50.78	50.41	49.21
Agriculture and natural resources	7.63	5.03	6.81	7.61
Manufacturing, construction, & mining	23.27	22.91	24.36	24.49
Transportation, telecom, & utilities	7.55	6.39	6.45	6.32
Professional, finance, real estate services	9.60	11.72	11.84	9.59
Health, social, & educational services	24.26	25.14	23.15	23.80
Retail & leisure services	22.01	22.81	21.30	22.00
Income 2016				
Median Household income ($)	$48,109	$52,848	$52,798	$51,405
Poverty (%)	13.20	11.72	11.59	11.71
Gini income inequality (0-100)	43.36	42.98	42.50	42.86

Social Conditions				
Opioid-Use Deaths 2014 to 2016	*High*	*Above Average*	*Average*	*Low-Below Average*
Number of counties	9	16	20	54
Organizations 2014 (# per 10,000)				
Religious organizations	119.61	105.31	123.22	142.64
Civic, social, & political organizations	6.60	13.54	11.64	11.79
Business, professional, & labor organizations	18.34	22.49	19.95	16.55
Recreational organizations	29.19	25.49	31.42	33.53
Non-profit entities	787.80	815.65	752.90	792.30
Civic Participation 2014 (%)				
Response rate to Census	71.57	72.42	70.26	71.54
Voter turnout in national elections	76.33	79.31	77.30	78.46
Crime 2014-16 (# per 100,000)				
Opioid prescribing rate (# per 100)	54.09	69.77	52.43	61.58
Non-cannabis drug arrests	50.60	94.91	74.02	77.83
Opioid & narcotics arrests	7.23	19.54	7.63	8.84
Violent crimes	68.51	120.40	96.75	105.06
Property crimes	183.71	396.94	275.62	290.03